

Teachers' perceptions and practices of inquiry-based teaching and learning using CASE curriculum

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Introduction/Need for Research

One of the research priority areas of the American Association for Agricultural Education (AAAE) National Research Agenda (Stripling & Ricketts, 2016) focuses on effective integrated STEM education in school-based agricultural education pedagogy. Perceiving the needs for more inquiry-based educational resources, the Curriculum for Agricultural Science Education (CASE) offers ten different STEM focused curriculums. The CASE model is “a careful blend of time-tested instructional strategies used to guide students in their studies to meet the demands of post-secondary education and careers in the Agriculture, Food and Natural Resource (AFNR) industries” (CASE, 2012, pg. 1, Wiggins, G. P, & McTighe, J., 2005). Although CASE appeared to be an answer to the long-standing need for change that exists in agricultural education (Transforming Agricultural Education for a Changing World, 2009), most research focused on teachers' efficacy (Ulmer et al., 2013) and students' perceptions of the CASE curriculum (Velez, Lambert, Elliott, 2012). No research has been done on how teachers perceive inquiry-based teaching by using CASE. The study asked three research questions to address the needs for more research on CASE. These questions are: (1) What are CASE trained teachers' understanding and experiences as related to inquiry-based teaching and learning; (2) What are CASE trained teachers' perceptions of using CASE curriculum with respect to inquiry-based instruction; and (3) How does CASE trained teachers use CASE curriculum to practice (implement) inquiry-based instruction?

Conceptual Framework

CASE's inquiry-based teaching philosophy is grounded in three different type of inquiry-based learning including structured, guided, and open inquiry that is defined by Colburn (2004). The National Science Education Standards (NRC, 1996, 2000) was the foundation that Colburn (2004) used to build his philosophy of inquiry-based instruction. This study traced back to the National Science Education Standards' Rubric (NRC, 1996, 2000), and used it as the conceptual framework to hold the standards of inquiry-based instructions. The rubric has five essential features of inquiry-based learning and their variations depending on what students and teachers are more in-control of. The definitions as well as the rubric (NRC, 1996, 2000) were used to determine CASE certified teachers' understanding of inquiry-based instruction and those ideas within CASE curriculum.

Methodology

This study was conducted using a cross-sectional survey examining practices, beliefs and opinions. Group comparisons will be made between Agriculture, Food & Natural Resources (AFNR) and Food Science & Safety (FSS) certified teachers. AFNR and FSS were selected as the subject areas for the study because AFNR is an introductory course for CASE or a “Level 1” and FSS is an advanced course or a “Level 3; the levels indicate the increasing amount of student control, which is the level of inquiry. Two different surveys, AFNR and FSS, were created for the study. Both surveys featured the same questions but were tailored to each curriculum. Qualtrics, an online based survey tool, was used to distribute the survey. 42 survey questions separated into 3 blocks. Each block in the survey pertained to a different research question we posed. Total 349 responses from AFNR and 43 from FSS (the response rate is 29%). The results from each survey were analyzed using descriptive statistics.

Results/Findings

To gain insight about how teachers understood inquiry-based learning, we included a question asking them to identify the different levels of inquiry, given an example or definition. Based on the results, teachers trained in FSS only marginally understood the different levels better than those trained in AFNR, but both groups showed confusion.

Inquiry Level	% Correct AFNR	% Correct FSS
Confirmation	49.42%	72%
Structured	58.72%	80%
Guided	44.19%	60%
Open	83.72%	80%

The result of research question one connected with research question two, with how participants scored lessons when given a rubric. When asked to select and score a lesson that was the best representative of inquiry-based learning, participants gave it a score that corresponded with being open inquiry, but the lesson was closer to be identified as structured inquiry based on the rubric (NRC, 1996, 2000). Major findings regarding teachers' use of the curriculum showed only 29.60% of AFNR teachers follow the lessons in succession, and even fewer without skipping or modifying anything. Only 4.76% of teachers cited never skipping, removing or replacing a lesson, leaving a majority (95.25%) of AFNR teachers going against CASE recommendations. All FSS teachers surveyed cited skipping or removing lessons. The biggest factor that teachers were removing or skipping lessons was not having adequate supplies to complete the lesson (25.38% AFNR/ 28.57% FSS).

Conclusions

Based on the results, our data suggests that teachers struggle to understand the different levels of inquiry that are built into the curriculum. Teachers were easily able to identify open inquiry, as it mirrors conducting a research or science fair project but struggled when it came to identifying nuances that separate guided from structured. This ties into teachers citing using structured or guided inquiry most often, yet rating lessons they would use daily as being open inquiry. The lessons selected were majority activities which should be structured inquiry according to CASE philosophy, yet teachers rate it as being open inquiry. During a CASE curriculum training, there is very little dedicated time to discussing the CASE curriculum philosophy. Being aware and understanding the differences in the activity on a philosophical level could help teachers with delivery of the curriculum. In addition, CASE could potentially modify and expand their curriculum offerings for block schedules, semester courses, or even have ale cart lessons. This could even come in the form of a suggested schedule including lessons to teach over a semester or quarter, from current curriculums. This could potentially reduce the amount of knowledge being lost to skipping and modifying the lessons and units. Furthermore, providing teachers with supplemental materials, would help teachers feel more comfortable with the curriculum rather than discouraging them.

Implications/Recommendations/ Impact on Profession

Our results indicated an issue in the agricultural education community as inquiry-based and problem-based instruction have no clear distinction, despite being philosophically different. In the agricultural education community, problem-based instruction and inquiry-based instruction are used synonymously which adds to the confusion teachers are having about what inquiry-based instruction actually is. To diffuse this problem, a professional society such as AAAE or the Council for Agricultural Education should help teachers understand what inquiry-based teaching really means in agricultural education and how it is demonstrated.

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